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EXAMINER

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

DETAILED ACTION

Advisory Action

Response to Amendment

Claims 20-22, 24-26, 28-30, 32-34, 36-38, 40-45 are pending in this application.

In view of the remarks, filed on 04/14/2008, following rejections are maintained for the reason of the record as given in the previous office action. The bases of these rejections are the same as given in the previous office action mailed on 01/14/2008.

- Rejection of claims 20 and 24 under 35 U.S.C. 103 (a) as being unpatentable over Fusegawa et al. (US 2003/0106484) in view of prior art submitted by the applicants JP (2003-297840)
- Rejection of claims 21 and 25 under 35 U.S.C. 103 (a) as being unpatentable over Fusegawa et al. (US 2003/0106484) in view of JP (2003-297840) and further in view of Haas et al (US 4,119,441)
- Rejection of claims 22 and 26 under 35 U.S.C. 103 (a) as being unpatentable over Fusegawa et al. (US 2003/0106484) in view of JP (2003-297840) and further in view of Asayama et al (US 6,641,888)
- Rejection of claims 28, 32, 36, 40, and 41 under 35 U.S.C. 103 (a) as being unpatentable over Fusegawa et al. (US 2003/0106484) in view

- of JP (2003-297840) and further in view of Momoi et al (US 2002/0024152)
- Rejection of claims 29 under 35 U.S.C. 103 (a) as being unpatentable over Fusegawa et al. (US 2003/0106484), JP (2003-297840), Haas et al (US 4,119,441), and further in view of Momoi et al (US 2002/0024152)
 - Rejection of claims 30 under 35 U.S.C. 103 (a) as being unpatentable over Fusegawa et al. (US 2003/0106484), JP (2003-297840), Asayama et al (US 6,641,888), and further in view of Momoi et al (US 2002/0024152)
 - Rejection of claims 33, 37, and 42-43 under 35 U.S.C. 103 (a) as being unpatentable over Fusegawa et al. (US 2003/0106484), JP (2003-297840), Momoi et al (US 2002/0024152), and further in view of Haas et al. (US 4,119,441)
 - Rejection of claims 34, 38, 44-45 under 35 U.S.C. 103 (a) as being unpatentable over Fusegawa et al. (US 2003/0106484), JP (2003-297840), Momoi et al. ('152), and further in view of Asayama et al (US 6,641,888)

Response to Arguments

Applicants' arguments filed on 04/14/2008 have been fully considered but they are not persuasive.

Applicants argue the proposed combinations of Fusegawa et al (US 2003/0106484) with JP (2003-297840) will not result in the method of the present invention as recited in the rejected claims because the office has not articulated reasoning with some rational underpinning to support the legal conclusion of obviousness. Instead, the office simply identifies JP '840 as an "analogous art" and concludes that it would have been obvious "to increase confidence level in overall process control for manufacturing method of silicon wafer of fusegawa... in order to measure the strength of silicon wafer since oxygen concentration is effective for enhancing the strength of a silicon wafer, as suggested by JP (2003-297840)".

This is not found persuasive. Fusegawa et al. ('484) teach a method of growing a silicon single crystal wafer which has been sliced from a silicon single crystal, wherein the silicon wafer is heat treated in an oxidizing atmosphere (See paragraphs [0013] and [0030]); also JP (2003-297840) teaches a process for the heat treatment of a silicon wafer during which the silicon wafer is exposed to an oxygen-containing atmosphere in which the heat treatment takes place at a temperature which is selected in such a way that the inequality $[O_i] < [O_i]^{eq}(T) \exp\left(\frac{2\sigma_{SiO_2}\Omega}{r k T}\right)$ is satisfied, where $[O_i]$ is the oxygen concentration in the silicon wafer (See abstract and paragraphs [0019] - [0022]); Furthermore, JP (2003-297840) teaches the produced silicon wafer is free of COPs not only in a layer close to the surface but also over a significant

part of the wafer thickness. (See abstract and paragraphs [0018] - [0019]). It would have been obvious for one of ordinary skill in the art that removing COPs from the silicon structure improves the quality and in result the strength of the silicon product. Therefore, JP (2003-297840) clearly teaches providing a relationship between the interstitial oxygen concentration $[O_i]$ and temperature $[T]$ in order to obtain a concentration of oxygen inside of the silicon wafer which has a direct affect on the number of COPs to control the value of oxygen concentration $[O_i]$ and temperature $[T]$ in such a way that by decreasing the number of COPs the strength of silicon wafer enhances. In result the combination Fusegawa et al. ('484) and JP (2003-297840) is proper and there is a motivation to support the conclusion of obviousness.

Furthermore, applicants argue that Fusegawa et al. ('484) discloses nothing concerning the relationship between the interstitial oxygen concentration of the wafer between the interstitial oxygen concentration of the wafer and the heat treatment temperature of the wafer.

This is not found persuasive because Fusegawa et al. ('484) clearly teaches if a silicon wafer having a high interstitial oxygen concentration is subjected to a heat treatment at a high temperature of 1150°C and in an oxidizing atmosphere can cause formation of defects such as OSF in the silicon structure. (See paragraph [0014]) Therefore, Fusegawa et al. ('484) teaches a relationship between the interstitial oxygen concentration of the wafer and the heat treatment temperature of the wafer.

Furthermore, applicants argue the range of $[O_i]$ is not clear and is not definite, and the equation on the present application can not easily be conceived of from the equation in (JP '840). Specifically, in terms of the oxygen concentration and the heat treatment temperature, the relational expression required according to the method for the present invention can not be derived using the disclosure in the JP ('840) reference, which shows an uncertain fixed relational expression.

However, this is not found persuasive because (JP '840) clearly teaches a range of oxygen concentration $[O_i]$ which varies within a specified range with the variation in the value of $[T]$ heat treatment temperature and other variables such as the surface energy (σ), precipitated oxygen atom (Ω) and the mean COP radius $[r]$ indicated in the disclosed relationship. (See table 1) therefore, the range of $[O_i]$ is clear and definite.

Therefore, rejections of claims 20-22, 24-26, 28-30, 32-34, 36-38, 40-45 are maintained.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Seyed Masoud Malekzadeh whose telephone number is 571-272-6215. The examiner can normally be reached on Monday – Friday at 8:30 am – 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Griffin, can be reached on (571) 272-1189. The fax number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published application may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/S. M. M./

Examiner, Art Unit 1791